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ABSTRACT

The first step in assessing physical education student teachers' content-related knowledge base is to establish current levels of subdisciplinary knowledge in students and prospective teachers alike. Researchers developed seven multiple-choice tests, based on the National Physical Education Standards Education text, "Concepts of Physical Education: What Every Student Needs to Know," in order to assess subdisciplinary concept knowledge in the areas of aesthetic experience, biomechanics, exercise physiology historical perspectives, motor development, motor learning, and social psychology. These tests, the Assessment of Subdisciplinary Knowledge in Physical Education (ASK-PE), were used to assess high school students' conceptual physical education knowledge. On all tests, females significantly outscored males. Preservice physical educators enrolled in an introductory major's course (PRE) and in the final semester of student teaching (POST) also completed the ASK-PE. In the PRE group, females outscored males on all but one test. In the POST group, males outscored females on five of the seven tests. In all three groups, participants had the most difficulty with the historical test. High school students' and PRE teachers' best scores were on the motor development test. POST teachers' highest scores were on the exercise physiology test. (Contains 16 references.) (SM)

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Assessing Subdisciplinary Concept Knowledge of Preservice Physical Education Teachers

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West Virginia University

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Running Head: Assessing PETE Knowledge

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Abstract

The National Physical Education Standards (National Association of Sport and Physical Education [NASPE], 1995) define what every student in the United States should know, be able to do and appreciate about physical education. The process of developing physically educated individuals includes addressing cognitive development. Since knowledge in the cognitive domain is critical to student performance, teachers need the skills to develop that knowledge in students. Teachers' ability to do this, however, rests largely on their own level of content-related cognitive knowledge. The first step in assessing this knowledge base is to establish current levels of subdisciplinary knowledge in students and prospective teachers alike.

Seven multiple-choice tests, based on the NASPE text *Concepts of Physical Education: What Every Student Needs to Know* (Mohnsen, 1998), were developed to assess subdisciplinary concept knowledge in the areas of aesthetic experience, biomechanics, exercise physiology, historical perspectives, motor development, motor learning, and social psychology. These tests were used to assess high school students' (N=3,263) conceptual physical education knowledge. On all but one test (biomechanics), females significantly (p=.0001) outscored males. Students performed best on the motor development test (average=64%) and worst on the historical perspectives (average=48%) test.

Currently prospective teachers' knowledge is being assessed at the beginning and end of the preservice program. These data will be used to improve the quality of preservice physical education teacher education (PETE) training by identifying areas of strength and weaknesses in the preservice curriculum. This will also help determine if PETE students leave the program with the intended knowledge. Initial findings from the first stage of PETE data collection will be shared with participants and the way these data relate to the high school findings will be explored.

Assessing Subdisciplinary Concept Knowledge of Preservice Physical Education Teachers

The cognitive domain has long been emphasized as a critical component of physical education (AAHPER, 1969; National Association for Sport and Physical Education [NASPE], 1995), yet according to Lawson (1987) it continues to be the least represented outcome in our profession. Through the NASPE K-12 standards, published in 1995, the American Alliance of Health, Physical Education, Recreation and Dance (AAHPERD) has presented a compelling case for the place of knowledge in the development of physically educated individuals. The National Physical Education Standards (National Association of Sport and Physical Education [NASPE], 1995) define what every student in the United States should know, be able to do and appreciate about physical education.

The most recent AAHEPRD-driven identification of critical subdisciplinary knowledge is Mohnsen's (1998) textbook, Concepts of Physical Education: What Every Student Needs to Know. This text was developed to identify the knowledge underlying the national standards and includes critical knowledge for aesthetic experiences, biomechanics, exercise physiology, historical perspectives, motor development, motor learning, and social psychology.

The process of developing physically educated individuals includes addressing the cognitive domain. A first step in assessing this knowledge base is to establish current levels of subdisciplinary knowledge in both students and prospective teachers. A recent monograph examining learners' domain-specific knowledge included a report on common conceptions and misconceptions about health-related fitness (Placek, Griffin, Dodds, Raymond, Tremino, & James, 2001). Participants' lack of understanding about fitness concepts was disconcerting, particularly given the recent emphasis on health-related fitness by AAHPERD and most other national health organizations such as the Center for Disease Control, the US Department of Health and Human Services and the President's Council on Physical Fitness. The consistency between these youths' misconceptions and common adult

misconceptions supported the authors' point that, "Knowledge is necessary but not sufficient to ensure students' participation in an active lifestyle" (Placek et al., p. 323).

According to the US Department of Health and Human Services (2000), in 1999 only 27% of high school students participated in moderate physical activity for at least 30 minutes on five or more days per week. Unfortunately, only 15% of adults report this level of regular physical activity. Given these statistics, it is obvious that something needs to change. One of the ways the present study can contribute to improved health status is by providing a measure of the cognitive knowledge students possess which can be a beginning point for behavior changes. Since knowledge in the cognitive domain is critical to student performance, teachers need the skills to develop that knowledge in students. Teachers' ability to do this, however, rests largely on their own level of content-related cognitive knowledge.

Although the need to include cognitive assessment in physical education has been widely addressed in the literature by Ayers (2001a), Dodds, Griffin, & Placek (2001), Graber (2001), and NASPE (1995), there remains little research examining how this can be achieved at the conceptual level. Existing physical education cognitive measures have assessed popular sports and activities (McGee & Farrow, 1987) and specific curricular materials (Williams, Harageones, Johnson, & Smith, 1998). Many researchers, including Mood (1971), Stradtman & Cureton (1950) and Zhu, Safrit, & Cohen (1999), have developed fitness knowledge tests. However, comprehensive assessment of the knowledge base has been absent from this body of literature. Currently we lack clarity on students' knowledge in the subdisciplinary areas relative to what AAHPERD has deemed critical to be a physically educated individual.

Given the paucity of cognitive tools available to assess subdisciplinary concept knowledge in physical education, Ayers (2001b) developed a seven-test battery, the Assessment of Subdisciplinary Knowledge in Physical Education or ASK-PE. These tests were developed to assess high school

students' conceptual knowledge of the content identified as critical in each of the seven areas in Mohnsen's text (1998). A complete report of the instrument development process is available (Ayers, 2001b), however, a brief overview of the procedures follows. Items were categorized by cognitive demands and by the critical concepts outlined in each chapter of Mohnsen's text (1998). Two pilot tests were administered to 413 high school students, content area experts reviewed all items, and judgmental item bias review procedures were completed on all tests. Content and construct validity were found to support the quality of the items and the constructs being assessed. The reading characteristics of the ASK-PE battery were reported as equivalent to an average sixth grade reading level.

Since knowledge in the cognitive domain is critical to student performance, teachers need the skills to develop that knowledge in students. Teachers' ability to do this, however, rests largely on their own level of content-related cognitive knowledge. A first step in assessing this knowledge base was to establish high school students' physical education conceptual knowledge as identified by NASPE in Mohnsen's text (1998). Upon completion of the first examination of this knowledge base, the next logical step was to relate students' knowledge to that of prospective physical education teachers.

Based on this decision, two groups of individuals were tested in the West Virginia University department of Physical Education Teacher Education (PETE); those enrolled in an introductory major's course (PRE) and those enrolled in the final semester of student teaching (POST). Participants completed all seven ASK-PE tests. Eventually, all West Virginia University PETE students will complete a pre and post-test. However, the current results represent three independent groups of examinees.

Results

High School Examinees

3,263 high school students of district-level NASPE Teachers of the Year in 16 different states completed tests. These individuals were 58.5% female and 60.4% Caucasian. According to Ayers (2001b), these examinees yielded results including average percent correct values from 0.48 - 0.64 and reliability values between 0.70 - 0.94. The ASK-PE test battery provided a valid and reliable measure of conceptual physical education knowledge as identified in Mohnsen's (1998) text.

Females scored higher than males on every test. Using criteria identified by Thomas, Lochbaum, Landers and He (1997), the gender effect size was moderate (0.50 - 0.56) on the aesthetics, exercise physiology, motor development, and social psychology tests and negligible to small (0.11 - 0.36) on the biomechanics, historical perspectives and motor learning tests. When compared by race, Caucasian examinees scored higher on all tests than all other racial groups. The effect size between the highest (Caucasian) and lowest (African American or Hispanic) scoring examines was moderate to large (0.68 - 1.2) on all tests. Using average percent correct values as a scale, examinees performed the "best" on the motor development test (0.64) and the "worst" on the historical perspectives test (0.48).

PRE Teachers

The individuals enrolled in an introductory major's course at West Virginia University ($n = 80$) who completed the ASK-PE battery were composed of 88% male and 91% Caucasian students. These individuals' average test scores were real and meaningfully different than those of the high school examinees on all tests, with a moderate to large effect size (0.50 - 0.96) on the biomechanics, exercise physiology, historical perspectives, motor learning and social psychology tests. The aesthetic experiences and motor development tests had a small effect size (0.42 and 0.44, respectively).

Comparing test performance by gender, female PRE teachers scored higher than their male counterparts on all but the historical perspectives test. These were real and meaningful differences with a large effect size (1.19) on the social psychology test, moderate effect sizes (0.51 - 0.76) on the aesthetic experiences, exercise physiology, historical perspectives and motor development tests, and a small (0.46) effect size on the motor learning test. Using average percent correct values as a scale, PRE examinees performed the "best" on the motor development and exercise physiology tests (0.76) and the "worst" on the historical perspectives test (0.59).

POST Teachers

The individuals enrolled in the student teaching experience at West Virginia University (n = 24) who completed the ASK-PE battery were composed of 66% male and 85% Caucasian students. These individuals' test scores were real and meaningfully different than those of the PRE examinees on all tests, with a moderate to large effect size (0.50 - 0.97) on the biomechanics, exercise physiology, historical perspectives, motor learning and social psychology tests. The aesthetic experiences and motor development tests had a small effect size (0.44 and 0.42, respectively).

Comparing test performance by gender, male POST teachers scored higher than their female counterparts on all but the motor development and social psychology tests. On all except the aesthetic experiences test (ES = 0.17), these were real and meaningful differences. There was a large effect size (0.89) on the motor learning test, a moderate effect size (0.65) on the biomechanics test, and small effect sizes (0.22 - 0.48) on the exercise physiology, historical perspectives, motor development and social psychology tests. Using average percent correct values as a scale, POST examinees performed the "best" on the exercise physiology test (0.87) and the "worst" on the historical perspectives test (0.68).

Discussion

It is important to identify that three distinct groups are represented in these data; high school physical education students from 16 states, West Virginia University students just entering the core coursework in the teacher preparation program, and individuals in the final semester of the teacher preparation program. None of the data represent the same individuals' scores as pre-post values.

In the initial data set, female high school students outscored their male counterparts on all tests. In the PRE teacher's group this was the case on all but one test. In the POST teacher's group, the exact opposite was found; male POST teachers outscored their female counterparts on five of the seven tests. This may be a result of the small sample size and/or the disproportionate under representation of females in the two West Virginia University groups.

The most interesting finding across all three groups was the consistency of examinee performance. All examinees had the most difficulty with the historical perspectives test. The only difference among groups on this test was the level of difficulty; the high school students scored the lowest, the PRE teachers higher and the POST teachers the highest. It is possible to suggest that this poor performance may be due to low content coverage by teachers and professors, low perceived relevance to students, or simply to having increased knowledge in general with increased age.

The term "performance continuum" could be used to describe examinees' best performances. The high school students' highest average score was earned on the motor development test, the PRE teachers highest scores were on the motor development and exercise physiology tests, and the POST teachers highest score was on the exercise physiology test. The relationship between the motor development and exercise physiology tests may be explained by the coverage of the content provided by teachers. For example, the high school teachers included in the initial study reported the most coverage of exercise physiology and motor development content in a "typical" class.

The PRE teachers' knowledge of both the motor development and exercise physiology content could be a reflection of their high school experiences as well as the programmatic emphasis on these areas at West Virginia University. This hypothesis holds when considering that the POST teachers also excelled on the exercise physiology test. Both the PRE and POST teachers demonstrated a solid knowledge of areas that can widely be associated with lifelong learning skills and physical activity patterns. This is a positive finding, given the need for teachers to possess adequate knowledge before entering the physical education profession.

Although these findings are not yet generalizeable beyond West Virginia University, they do reflect a trend in our preservice teacher knowledge base relative to the NASPE standards towards which we strive. The finding that our POST teachers have a real and meaningfully different knowledge base than our PRE teachers is affirmation that our program is effective. These data also reveal that our teachers are prepared to provide public school students with the knowledge and skills necessary to participate in a physically active lifestyle.

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